

REMARKS

Upon entry of the Amendment, Claims 1-9 will be pending in the application.

Claim 1 is amended to recite “wherein the ammonium nitrate is a major component for providing oxidative property of the slurry.”

New Claims 8 and 9 are added.

Entry of the Amendment is respectfully requested along with reconsideration and review of the claims on the merits.

Claim Rejections Under § 102 and 103

A. Claim 1 is rejected under 35 U.S.C. §102(a) as assertedly anticipated by Merchant et al. (U.S. Patent No. 6,599,837), for the reasons given in the Office Action.

B. Claims 2-7 are rejected under 35 U.S.C. §103(a) as assertedly being obvious over Merchant et al., for the reasons given in the Office Action.

Applicants respond as follows to the above rejections in paragraphs A and B.

As previously noted, Claim 1 is amended to recite “wherein the ammonium nitrate is a major component for providing oxidative property of the slurry.”

Merchant fails to anticipate or render obvious the present invention.

Merchant discloses that a polishing composition having pH 3-6 comprises an abrasive, an oxidizer, a triazole or triazole derivative (hereinafter "triazole compound") and water; and that a ferricyanide salt is used as the oxidizer; and that examples of the triazole compound include 1,2,4-triazole (see column 3, lines 18-43). Merchant also discloses that, in addition to the ferricyanide salt, the polishing composition can include an additional oxidizing agent, and that

examples of the additional oxidizing agent include ammonium nitrate (see column 3, lines 44-52).

The Examiner states that Merchant teaches compositions which comprise all of the claimed components.

However, Merchant does not disclose at least polishing slurries which comprise ammonium nitrate as well as 1,2,4-triazole where the ammonium nitrate is a major component for providing oxidative property of the polishing slurries.

Although Merchant discloses a combination of a triazole compound and a ferricyanide salt which can provide the benefits of a polishing composition (see column 2, lines 26-29), Merchant does not disclose in one place a combination of 1,2,4-triazole and ammonium nitrate. In Merchant, ammonium nitrate is merely an additional component, which is not an essential component (see column 3, lines 62-64). In addition, Merchant discloses that benzotriazole (BTA) is more preferable than 1,2,4-triazole as a triazole compound (see column 3, lines 18-43); and that 1,2,4-triazole is merely one of the examples of the triazole compound.

In contrast, polishing slurries of the present invention comprise ammonium nitrate as a major component for providing the oxidative property of the slurries; and in the present polishing slurries, 1,2,4-triazole (not BTA) is used as a triazole compound in combination with ammonium nitrate. Thus, Applicants submit that in Merchant there is no description directly showing polishing slurries of the present invention that comprise ammonium nitrate as well as 1,2,4-triazole.

Furthermore, Merchant discloses that the polishing rate tends to decrease when ammonium nitrate or BTA (which is a triazole compound) concentrations are increased (see column 4, lines 28-33).

On the contrary, polishing slurries of the present invention provide a higher polishing rate when the polishing slurries having a pH within a range of 3 to 4 comprise ammonium nitrate as well as 1,2,4-triazole in a sufficient amount as shown in the present specification (page 7, lines 14-21; page 8, lines 3-10; Tables 2-3). That is, the present polishing slurries provides unanticipated benefits contrary to the teaching of Merchant.

Thus, a person skilled in the art cannot find a combination of ammonium nitrate and 1,2,4-triazole in Merchant in order to realize the benefit of the present polishing slurries. Therefore, the present invention is patentable over Merchant.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the anticipation rejection and obviousness rejection citing Merchant et al.

C. Claims 1-7 are rejected under 35 U.S.C. §103(a) as assertedly being obvious over Mandigo et al. (U.S. Publication No. 2002/0062600) in view of Merchant et al., for the reasons given in the Office Action.

Applicants respond as follows.

Regarding rejection C above, the combination of Mandigo with Merchant fails to render obvious the present invention.

Mandigo discloses that a polishing composition having pH 2.8-3.8 comprises an abrasive, an oxidizer, an inhibitor (e.g. BTA), polyacrylic acid, a complexing agent (mono- and dicarboxylic acids and their salts, such as malic acid) and water; and that examples of the oxidizer include ammonium nitrate (see sections [0008]-[0013], [0016], [0026]-[0027]).

However, Mandigo does not disclose 1,2,4-triazole at all. In fact, BTA is used as an inhibitor in compositions of the EXAMPLES in Mandigo.

The Examiner states 1,2,4-triazole is obvious because it is a known corrosion inhibitor as is clearly shown by Merchant; and that 1,2,4-triazole and BTA are functionally equivalent inhibitors in polishing compositions, which is assertedly taught by Merchant.

However, as described above, the present polishing slurries that comprise ammonium nitrate as well as 1,2,4-triazole provide the unanticipated benefit of a higher polishing rate contrary to the teaching of Merchant. That is, 1,2,4-triazole and BTA do not have an equivalent function in the presence of ammonium nitrate. Thus, a person skilled in the art cannot easily replace BTA with 1,2,4-triazole.

In addition, ammonium nitrate is merely one of the examples of the oxidizer in Mandigo since ammonium nitrate is not used in any compositions of the EXAMPLES. In fact, hydrogen peroxide is used as an oxidizer in the compositions. Thus, in Mandigo, there is no description directly showing a combination of ammonium nitrate and BTA, much less a combination of ammonium nitrate and 1,2,4-triazole.

Thus, the present invention is not obvious over Mandigo in view of Merchant.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the obviousness rejection combining Mandigo with Merchant.

D. Claims 1-7 are rejected under 35 U.S.C. §103(a) as assertedly being obvious over Tsuchiya et al. (U.S. Patent No. 6,478,834) in view of Barr (U.S. Patent No. 4,275,051), for the reasons given in the Office Action.

Regarding rejection D above, the combination of Tsuchiya and Barr fails to render obvious the present invention.

Tsuchiya discloses that a polishing composition having pH 3-9 comprises an abrasive, an oxidizer, an antioxidant, an amine compound and water; and that examples of the antioxidant include 1,2,4-triazole (see column 8, lines 60-65).

Barr discloses that ammonium nitrate is a water-soluble oxidizer.

The Examiner states that ammonium nitrate is obvious because it is a water-soluble oxidizer as shown by Barr, and the claimed invention is assertedly obvious over Tsuchiya in view of Barr.

However, the present polishing slurries having a pH within a range of 3 to 4 that comprise ammonium nitrate as well as 1,2,4-triazole can provide the unanticipated benefit of a higher polishing rate. Generally, polishing slurries comprising an ordinary water-soluble oxidizer do not provide such desired effect. As shown in Table 4 of the present specification (Comparative Examples 11 and 12), a combination of hydrogen peroxide (which is one of various ordinary water-soluble oxidizers) and 1,2,4-triazole provides an undesirable Cu polishing

rate, which results in an undesirable Cu/Ta polishing rate ratio. Also, even if ammonium nitrate as a water-soluble oxidizer is used in polishing compositions, a combination of ammonium nitrate and BTA cannot provide the desired effect as shown in Table 1 of the present specification (Comparative Examples 3-5).

Tsuchiya discloses that BTA is one of the antioxidants including 1,2,4-triazole, and that 1,2,4-triazole and BTA are functionally equivalent in polishing compositions (see column 8, line 60 to column 9, line 10). Thus, a person skilled in the art cannot easily select a combination of ammonium nitrate and 1,2,4-triazole as a combination of a water-soluble oxidizer and an antioxidant in order to realize the unanticipated benefit of the present polishing slurries.

Thus, the present invention is not obvious over Tsuchiya in view of Barr.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the obviousness rejection citing the combination of Tsuchiya and Barr.

E. Claims 1-7 are rejected under 35 U.S.C. §103(a) as assertedly being obvious over Schroeder et al. (U.S. Publication No. 2003/0228763) in view of Merchant et al., for the reasons given in the Office Action.

Applicants respond as follows.

Regarding rejection E above, Applicants request that the rejection citing Schroeder be withdrawn. Applicants submit concurrently herewith a certified English translation of the Priority Document JP 2003-047552 filed on February 25, 2003. The Priority Document fulfills the disclosure requirement of 35 U.S.C. § 112. As the filing date of the priority document

document antedates the publication date of Schroeder under 35 U.S.C. § 102(a), Applicants respectfully request that Schroeder be removed as a reference against the present application.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the obviousness rejection citing Schroeder.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

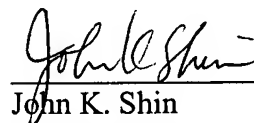
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